IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application

Applicant(s):	Brown et al.
Docket No.:	YOR920000807US1
Serial No.:	09/713,075
Filing Date:	November 15, 2000
Group:	2626
Examiner:	Lamont M. Spooner
Title:	System and Method for Finding the Most Likely Answer to a Natural Language Question

---

REPLY BRIEF

Mail Stop Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Appellants hereby reply to the Examiner's Answer, mailed September 25, 2006 (referred to hereinafter as "the Examiner's Answer"), in an Appeal of the final rejection of claims 1-12 in the above-identified patent application.

REAL PARTY IN INTEREST

A statement identifying the real party in interest is contained in Appellants' Appeal Brief.

RELATED APPEALS AND INTERFERENCES

A statement identifying related appeals is contained in Appellants' Appeal Brief.

STATUS OF CLAIMS

Appellants withdraw the appeal of claims 5 and 9. Claims 1, 7, and 12 are being appealed.

STATUS OF AMENDMENTS

A statement identifying the status of the amendments is contained in Appellants' Appeal Brief.

SUMMARY OF CLAIMED SUBJECT MATTER

A Summary of the Invention is contained in Appellants' Appeal Brief.

STATEMENT OF GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A statement identifying the grounds of rejection to be reviewed on appeal is contained in Appellants' Appeal Brief.

CLAIMS APPEALED

A copy of the appealed claims is contained in an Appendix of Appellants' Appeal Brief.

ARGUMENT

In the Response to Arguments section of the Examiner's Answer, the Examiner asserts that Kupiec teaches an "explicit answer to a question" (col. 32, Table 8: Mailer, Norman; col. 31, Table 7; col. 37, lines 38-53).

Regarding the Examiner's comment on Table 8, Applicants note that the phrase "Mailer, Norman" actually refers to the title of the document, and that any explicit answer to the question appears to be coincidental. In Table 8, Kupiec teaches "Document

Title: Mailer, Norman." If "Mailer, Norman" was the answer discovered in the text, a person of ordinary skill in the art would expect the answer to be "Norman Mailer," *which is how the cited name appears in the relevant text of Table 8.*

Also, regarding Table 8, Kupiec teaches that

> the presentation here is different from that of prior art IR systems. Answer hypotheses are shown to the user to focus his or her attention on likely answers and how they relate to other phrases in the question. The text presented is not necessarily from documents that have high similarity scores, but rather from documents that confirm phrase relations that lend evidence for an answer. This behavior is readily understood by users, even though they have not been involved in the tedious intermediate work done by the system
>
> In Table 8, the first two sentences are from primary documents. The last sentence confirming Norman Mailer as a novelist is a from a secondary document. The sentence was confirmed by a lexico-syntactic pattern which identifies the answer hypothesis as being in a list-inclusion relationship with the type phrase.
> (Col. 32, line 64, to col. 33, line 11.)

In the Appeal Brief, Appellants noted that, regarding Table 7, Kupiec teaches that "the relevant ***articles*** *are heuristically scored* according to the degree and number of matches with the phrases of the input question. . . *After scoring, the relevant articles are ranked according to their scores*." (Col. 31, lines 34-41; emphasis added.) After the hypothetical answers are extracted, Kupiec teaches that "answer hypotheses are *scored on a* ***per-article basis*** *according to the* ***sum of the scores of the articles*** *in which they occur*." (Col. 31, lines 52-62; emphasis added.) Kupiec teaches that answer scores are ***based on the article scores***; Kupiec does ***not*** disclose or suggest that answer scores are ***based on scoring features*** *of* ***possible answers***. More importantly, Kupiec teaches that, "*for the question given in Table 7 MURAX produces the output shown in Table 8.*" (Col. 32, lines 38-39; emphasis added.) Thus, a person of ordinary skill in the art would read these steps as also applying to Table 8.

Also, in the text cited by the Examiner, Kupiec teaches that

> it is illustrated in the following question and primary document match sentences:
>
> "What film pits Humphrey Bogart against gangsters in the Florida Keys?"

> " . . . Bacall and Bogart became a famous romantic couple in films such as The Big Sleep (1946) and Key Large (1948)."
>
> "Some of his most popular films were The Maltese Falcon (1941); Casablanca (1942), with Ingrid Bergman; The Big Sleep (1946) costarring his wife, Lauren Bacall; The Treasure of Sierra Madre (1948); . . . "
>
> Secondary co-occurrence queries determine that the answer hypothesis Key Largo co-occurs with Florida Keys, but the other "film" hypotheses do not; thus in the absence of stronger evidence to the contrary, Key Largo receives a preference.
> (Col. 37, lines 38-53.)

This teaching, however, does not contradict Kupiec's earlier teachings (cited above), including the teaching that *answer scores are based on the article scores*.

In the Examiner's Answer, the Examiner asserts that "each answer is scored on a per article basis, which is the score of the answer hypothesis, which is not a document, each answer hypothesis being scored based on an article- (the article is scored based on the degree and number of matches with the phrase of the input question which includes features of the answer), according to the sum of the scores of the articles in which they occur. More specifically, the article has a score, and the answer hypothesis also has a score, based on scoring features of possible answers."

As the Examiner acknowledges, Kupiec teaches that "answer hypotheses are *scored on a* ***per-article basis*** *according to the* ***sum of the scores of the articles*** *in which they occur*." Independent claim 1 requires extracting scoring features from a candidate list of passages of possible answers; scoring the possible answers ***using the extracted features and a feature scoring function***; and presenting the best scoring possible answer to the user with context from the passage containing the answer. Independent claim 7 requires a feature combination module, containing a ***"feature extraction" and "compute composite score" components***; an answer selection module and an answer presentation module, and independent claim 12 requires ***scoring "each possible answer phrase, selecting one or more of the best scoring answer phrases, and displaying the answer phrases to the user."*** Kupiec determines scores ***based on an entire article***, "where the degree and number of matches with the phrases of the *input*

questions" (col. 31, lines 34-36); Kupiec does not disclose or suggest that answers are scored using ***"extracted features and a feature scoring function."***

Regarding the Examiner's assertion that "one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references," Appellants note that the argument regarding Braden-Harder was not presented to attack the references individually, but was presented to demonstrate that ***none*** *of the cited references* disclose or suggest certain limitations that distinguish the present claims from the cited prior art.

Thus, Kupiec and Braden-Harder et al., alone or in combination, do not disclose or suggest extracting scoring features from a candidate list of passages of possible answers; scoring the possible answers using the extracted features and a feature scoring function; and presenting the best scoring possible answer to the user with context from the passage containing the answer, as required by claim 1, do not disclose or suggest a feature combination module, containing a "feature extraction" and "compute composite score" components; an answer selection module and an answer presentation module, as required by independent claim 7, and do not disclose or suggest scoring each possible answer phrase, selecting one or more of the best scoring answer phrases, and displaying the answer phrases to the user, as required by independent claim 12.

Conclusion

The rejections of the cited claims under sections 102 and 103 in view of Kupiec and Braden-Harder et al., alone or in combination, are therefore believed to be improper and should be withdrawn. The remaining rejected dependent claims are believed allowable for at least the reasons identified above with respect to the independent claims.

The attention of the Examiner and the Appeal Board to this matter is appreciated.

Respectfully,

Date: November 17, 2006

Kevin M. Mason
Attorney for Applicant(s)
Reg. No. 36,597
Ryan, Mason & Lewis, LLP
1300 Post Road, Suite 205
Fairfield, CT 06824
(203) 255-6560

APPENDIX

1. A method for selecting answers to natural language questions from a collection of textual documents comprising the steps of:

extracting scoring features from a candidate list of passages of possible answers;

scoring the possible answers using the extracted features and a feature scoring function; and

presenting the best scoring possible answer to the user with context from the passage containing the answer.

2. A method as in claim 1, wherein the features used to score possible answers consists of one or more of the following features: a semantic type of a current suspected answer, a position of the suspected answer among all suspected answers within all document passages, a position of the suspected answer among all suspected answers within the given passage, a number of suspected answers of a given semantic type retrieved within a given passage, a number of words in a suspected answer that do not appear in the user question, a position of the semantic type in the list of potential semantic types for the question, an average distance in words between the beginning of the potential answer and the words in the question that also appear in the passage, a passage relevance as computed by the information retrieval engine, a frequency of a given potential answer on the list, a semantic relation between words from the question and words from the potential answer, and a strength score that is a function of the relevance score.

3. A method as in claim 2, wherein the feature scoring function is a linear combination of weighted features.

4. A method as in claim 3, wherein the parameters of the scoring function are manually determined.

5. A method as in claim 3, wherein the parameters of the scoring function are learned by a machine learning algorithm.

6. A method as in claim 1 where the candidate list of passages of possible answers is obtained from the collection of documents using an information retrieval engine

7. A computer system that extracts answers to natural language questions from a large collection of textual documents consisting of one or more of the following modules:

a feature extraction module;

a feature combination module, containing a "feature extraction" and "compute composite score" components;

an answer selection module; and

an answer presentation module.

8 A computer system, as in claim 7, wherein the feature extraction module extracts one or more of the following features: a semantic type of the current suspected answer, a position of the suspected answer among all suspected answers within all document passages, a position of the suspected answer among all suspected answers within the given passage, a number of suspected answers of a given semantic type retrieved within a given passage, a number of words in an suspected answer that do not appear in the user question, a position of the semantic type in the list of potential semantic types for the question, an average distance in words between the beginning of the potential answer and the words in the question that also appear in the passage, a passage relevance as computed the retrieval engine, a frequency of a given potential answer on the list, a semantic relation between words from the question and words from the potential answer, and a strength score that is a function of the relevance score.

9 A computer system as in claim 7, wherein the feature combination module employs a feature scoring function with parameters learned by a machine learning method

10. A computer system as in claim 7, wherein the answer selection module selects the answer with the best score obtained from the feature combination module.

11. A computer system as in claim 7, wherein the answer presentation module shows the top scored answer within the context as specified by a user or a system

12. A computer program product that performs the steps of:

determining a feature scoring function during a training phase either manually or via a machine learning algorithm applied to a set of training questions, corresponding answer passages, and certain extracted features; and

during an execution phase, extracting certain features from questions and corresponding possible answer phrases, applying the feature scoring function determined during the training phase to score each possible answers phrase, selecting one or more of the best scoring answer phrases, and displaying the answer phrases to the user with optional additional context from the answer passages.

EVIDENCE APPENDIX

There is no evidence submitted pursuant to § 1.130, 1.131, or 1.132 or entered by the Examiner and relied upon by appellant.

RELATED PROCEEDINGS APPENDIX

There are no known decisions rendered by a court or the Board in any proceeding identified pursuant to paragraph (c)(1)(ii) of 37 CFR 41.37.